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NOTICE OF ALLOWANCE AND FEE(S) DUE

21186 7590 05/29/2008

SCHWEGMAN, LUNDBERG & WOESSNER, P.A.
P.O. BOX 2938
MINNEAPOLIS, MN 55402

EXAMINER	
WILLIAMS, LAWRENCE B	
ART UNIT	PAPER NUMBER
2611	

DATE MAILED: 05/29/2008

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/692,040	10/22/2003	Srikanth Nagaraja	1488.014US1	6426

TITLE OF INVENTION: APPARATUS, METHODS, SYSTEMS, AND ARTICLES INCORPORATING A CLOCK CORRECTION TECHNIQUE

APPLN. TYPE	SMALL ENTITY	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	NO	$1440	$300	$0	$1740	08/29/2008

THE APPLICATION IDENTIFIED ABOVE HAS BEEN EXAMINED AND IS ALLOWED FOR ISSUANCE AS A PATENT. PROSECUTION ON THE MERITS IS CLOSED. THIS NOTICE OF ALLOWANCE IS NOT A GRANT OF PATENT RIGHTS. THIS APPLICATION IS SUBJECT TO WITHDRAWAL FROM ISSUE AT THE INITIATIVE OF THE OFFICE OR UPON PETITION BY THE APPLICANT. SEE 37 CFR 1.313 AND MPEP 1308.

THE ISSUE FEE AND PUBLICATION FEE (IF REQUIRED) MUST BE PAID WITHIN THREE MONTHS FROM THE MAILING DATE OF THIS NOTICE OR THIS APPLICATION SHALL BE REGARDED AS ABANDONED. THIS STATUTORY PERIOD CANNOT BE EXTENDED. SEE 35 U.S.C. 151. THE ISSUE FEE DUE INDICATED ABOVE DOES NOT REFLECT A CREDIT FOR ANY PREVIOUSLY PAID ISSUE FEE IN THIS APPLICATION. IF AN ISSUE FEE HAS PREVIOUSLY BEEN PAID IN THIS APPLICATION (AS SHOWN ABOVE), THE RETURN OF PART B OF THIS FORM WILL BE CONSIDERED A REQUEST TO REAPPLY THE PREVIOUSLY PAID ISSUE FEE TOWARD THE ISSUE FEE NOW DUE.

HOW TO REPLY TO THIS NOTICE:

I. Review the SMALL ENTITY status shown above.

If the SMALL ENTITY is shown as YES, verify your current SMALL ENTITY status:

A. If the status is the same, pay the TOTAL FEE(S) DUE shown above.

B. If the status above is to be removed, check box 5b on Part B - Fee(s) Transmittal and pay the PUBLICATION FEE (if required) and twice the amount of the ISSUE FEE shown above, or

If the SMALL ENTITY is shown as NO:

A. Pay TOTAL FEE(S) DUE shown above, or

B. If applicant claimed SMALL ENTITY status before, or is now claiming SMALL ENTITY status, check box 5a on Part B - Fee(s) Transmittal and pay the PUBLICATION FEE (if required) and 1/2 the ISSUE FEE shown above.

II. PART B - FEE(S) TRANSMITTAL, or its equivalent, must be completed and returned to the United States Patent and Trademark Office (USPTO) with your ISSUE FEE and PUBLICATION FEE (if required). If you are charging the fee(s) to your deposit account, section "4b" of Part B - Fee(s) Transmittal should be completed and an extra copy of the form should be submitted. If an equivalent of Part B is filed, a request to reapply a previously paid issue fee must be clearly made, and delays in processing may occur due to the difficulty in recognizing the paper as an equivalent of Part B.

III. All communications regarding this application must give the application number. Please direct all communications prior to issuance to Mail Stop ISSUE FEE unless advised to the contrary.

IMPORTANT REMINDER: Utility patents issuing on applications filed on or after Dec. 12, 1980 may require payment of maintenance fees. It is patentee's responsibility to ensure timely payment of maintenance fees when due.

PTOL-85 (Rev. 08/07) Approved for use through 08/31/2010.

PART B - FEE(S) TRANSMITTAL

Complete and send this form, together with applicable fee(s), to: Mail **Mail Stop ISSUE FEE**
Commissioner for Patents
P.O. Box 1450
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or Fax (571)-273-2885

INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence including the Patent, advance orders and notification of maintenance fees will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications.

CURRENT CORRESPONDENCE ADDRESS (Note: Use Block 1 for any change of address)

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MINNEAPOLIS, MN 55402

Note: A certificate of mailing can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmission.

Certificate of Mailing or Transmission

I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being facsimile transmitted to the USPTO (571) 273-2885, on the date indicated below.

(Depositor's name)
(Signature)
(Date)

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10/692,040	10/22/2003	Srikanth Nagaraja	1488.014US1	6426

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nonprovisional	NO	$1440	$300	$0	$1740	08/29/2008

EXAMINER	ART UNIT	CLASS-SUBCLASS
WILLIAMS, LAWRENCE B	2611	375-354000

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).

❑ Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.

❑ "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-02 or more recent) attached. **Use of a Customer Number is required.**

2. For printing on the patent front page, list

(1) the names of up to 3 registered patent attorneys or agents OR, alternatively,

(2) the name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed.

1 _____

2 _____

3 _____

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document has been filed for recordation as set forth in 37 CFR 3.11. Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE (B) RESIDENCE: (CITY and STATE OR COUNTRY)

Please check the appropriate assignee category or categories (will not be printed on the patent) : ❑ Individual ❑ Corporation or other private group entity ❑ Government

4a. The following fee(s) are submitted:

❑ Issue Fee

❑ Publication Fee (No small entity discount permitted)

❑ Advance Order - # of Copies _____

4b. Payment of Fee(s): **(Please first reapply any previously paid issue fee shown above)**

❑ A check is enclosed.

❑ Payment by credit card. Form PTO-2038 is attached.

❑ The Director is hereby authorized to charge the required fee(s), any deficiency, or credit any overpayment, to Deposit Account Number _____ (enclose an extra copy of this form).

5. **Change in Entity Status** (from status indicated above)

❑ a. Applicant claims SMALL ENTITY status. See 37 CFR 1.27.

❑ b. Applicant is no longer claiming SMALL ENTITY status. See 37 CFR 1.27(g)(2).

NOTE: The Issue Fee and Publication Fee (if required) will not be accepted from anyone other than the applicant; a registered attorney or agent; or the assignee or other party in interest as shown by the records of the United States Patent and Trademark Office.

Authorized Signature _____ Date _____

Typed or printed name _____ Registration No. _____

This collection of information is required by 37 CFR 1.311. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, Virginia 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450.

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EXAMINER	
WILLIAMS, LAWRENCE B	
ART UNIT	PAPER NUMBER
2611	

DATE MAILED: 05/29/2008

Determination of Patent Term Adjustment under 35 U.S.C. 154 (b)
(application filed on or after May 29, 2000)

The Patent Term Adjustment to date is 807 day(s). If the issue fee is paid on the date that is three months after the mailing date of this notice and the patent issues on the Tuesday before the date that is 28 weeks (six and a half months) after the mailing date of this notice, the Patent Term Adjustment will be 807 day(s).

If a Continued Prosecution Application (CPA) was filed in the above-identified application, the filing date that determines Patent Term Adjustment is the filing date of the most recent CPA.

Applicant will be able to obtain more detailed information by accessing the Patent Application Information Retrieval (PAIR) WEB site (http://pair.uspto.gov).

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Customer Service Center of the Office of Patent Publication at 1-(888)-786-0101 or (571)-272-4200.

Notice of Allowability	Application No.	Applicant(s)	
	10/692,040	NAGARAJA, SRIKANTH	
	Examiner	Art Unit	
	Lawrence B. Williams	2611	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to *amendment filed on 3/10/2008*.

2. ☒ The allowed claim(s) is/are *1, 4-10, 12-15, 18-23, 26-30, 32-34, 37-38, 40, renumbered as 1-29, respectively*.

3. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
   a) ☐ All b) ☐ Some* c) ☐ None of the:
      1. ☐ Certified copies of the priority documents have been received.
      2. ☐ Certified copies of the priority documents have been received in Application No. _____ .
      3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

   * Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

4. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.

5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
   (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
      1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.
   (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.

   Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).

6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☐ Notice of References Cited (PTO-892)
2. ☐ Notice of Draftperson's Patent Drawing Review (PTO-948)
3. ☐ Information Disclosure Statements (PTO/SB/08), Paper No./Mail Date _____
4. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material
5. ☐ Notice of Informal Patent Application
6. ☐ Interview Summary (PTO-413), Paper No./Mail Date _____ .
7. ☐ Examiner's Amendment/Comment
8. ☒ Examiner's Statement of Reasons for Allowance
9. ☐ Other _____.

REASONS FOR ALLOWANCE

1. The following is an examiner's statement of reasons for allowance: The instant application discloses a method and apparatus for synchronizing a receiver clock with a transmitter clock in a communication system. A search of prior art records has failed to teach or suggest, alone or in combination a method for synchronizing a receiver clock with a transmitter clock in a communication system:

" wherein synchronizing the receiver and transmitter clocks comprises: receiving an input pilot signal of a predetermined frequency and phase, by a receiver from the transmitter; estimating the frequency and phase drifts between the transmitter and the receiver clocks using the input pilot signal; computing a clock correction parameter based on the phase and frequency drifts; and synchronizing the receiver clock with the transmitter clock based on the clock correction parameter; estimating a window length using the input pilot signal; forming a window using the window length for sampling the input pilot signal for estimating the frequency and phase drifts; estimating the frequency and phase drifts between the transmitter and the receiver clocks using the window; computing the clock correction parameter based on the phase and frequency drifts; and synchronizing the receiver and transmitter clocks based on the clock correction parameter" as disclosed in claim 1.

"wherein synchronizing the receiver and transmitter clocks comprises: obtaining a window length from an experimental knowledge base; forming a window using the window length; estimating the frequency and phase drifts between the transmitter and the receiver clocks using an input pilot signal and the window; computing a clock correction parameter based on the phase and frequency drift estimates; synchronizing the receiver and transmitter based on

the clock correction parameter; and repeating the estimating, computing and synchronizing steps for a next window" as disclosed in claim 10.

"wherein synchronizing the local receiver clock and the remote transmitter clock comprises: receiving a pilot signal by the local receiver from the remote transmitter along with a data signal transmitted by the remote transmitter, wherein the pilot signal is of a predetermined frequency and signal phase; estimating the phase and frequency drifts between the local receiver clock and the remote transmitter clock using the pilot signal; computing a clock correction parameter based on the phase and frequency drift estimates; and synchronizing the remote transmitter clock and local receiver clock based on the clock correction parameter; wherein estimating the frequency drift comprises: (a) obtaining a window length using a prior knowledge base; (b) forming a window using the window length; (c) receiving digital samples of the data signal; (d) outputting a predetermined number of pilot DFT points using the digital samples within the window; (e) computing angular differences between successive pilot DFT points within the window; (f) estimating the frequency drift by computing a weighted average of the angular differences within the window; and (g) repeating steps (a) through (f) to estimate the frequency drift for a subsequent window" as disclosed in claim 15.

Nor does the prior art teach or suggest, alone or in combination:

"a clock correction module in a local receiver to synchronize a local receiver clock, in the local receiver, with a remote transmitter clock, in a remote transmitter, in a multi-carrier communication system, while transmitting a data signal by the remote transmitter, comprising: a data sampler to sample an input pilot signal of a predetermined carrier frequency and phase; a frequency drift estimator, coupled to the data sampler, to receive the data signal along with the

input pilot signal, and to estimate a frequency drift between the receiver and transmitter clocks using the input pilot signal; a phase drift estimator, coupled to the data sampler and the frequency drift estimator, to receive the data signal along with the input pilot signal, and to estimate a phase drift between the receiver and transmitter clocks using the input pilot signal; an analyzer, coupled to the frequency drift estimator and the phase drift estimator, to receive the estimated phase and frequency drifts, and to compute a clock correction parameter based on the received estimated phase and frequency drifts; and a synchronizing block, coupled to the analyzer, to receive the clock correction parameter, and to adjust the receiver clock to synchronize the receiver clock with the transmitter clock based on the clock correction parameter; wherein the local receiver and the remote transmitter comprise a Digital-to-Analog Converter (DAC) and an Analog-to-Digital Converter (ADC), and wherein the clock correction module is configured to synchronize the local receiver ADC and DAC clocks with the remote transmitter ADC and DAC clocks using the clock correction parameter; and wherein the frequency drift estimator computes a signal-to-noise ratio of the received input pilot signal, wherein the frequency drift estimator estimates a window length based on the signal-to-noise ratio, and forms a window using the window length, and wherein the frequency drift estimator estimates the frequency drift between the transmitter and receiver clocks using the received data signal over the window length" as disclosed in claim 23.

"an apparatus for synchronizing local and remote transceiver clock signals in a communicating system, comprising: a data sampler to sample an input pilot signal along with a data signal, wherein the input pilot signal is of a predetermined carrier frequency and phase; a

frequency drift estimator, coupled to the data sampler, to receive the data signal and the input pilot signal, and to estimate a frequency drift between the local and remote transceiver clocks using the input pilot signal; a phase drill estimator, coupled to the data sampler and the frequency drill estimator, to receive the data signal and the input pilot signal, and to estimate a phase drift between the local and remote transceiver clocks using the input pilot signal; an analyzer, coupled to the frequency drill estimator and the phase drift estimator, to receive the estimated phase and frequency drills, and to compute a clock correction parameter based on the received estimated phase and frequency drifts; and a synchronizing block, coupled to the analyzer, to receive the clock correction parameter, and to adjust the local transceiver clock with respect to the input pilot signal, to synchronize the local transceiver clock to the remote transceiver clock, based on the clock correction parameter; wherein the frequency drift estimator obtains a window length from an experimental knowledge base and forms a window using the window length, wherein the frequency drift estimator receives digital samples of the transmitted data signal, and wherein the frequency drift estimator outputs pilot DFT points using the digital samples on a per-window basis, wherein the frequency drift estimator computes angular differences in phase between successive pilot DFT points within the first window, and wherein the frequency drift estimator estimates the frequency drift by computing a weighted average of the angular differences" as disclosed in claim 30.

"an article comprising a computer-readable medium which stores computer-executable instructions, the instructions causing a computer to: receive an input pilot signal, of a predetermined frequency, amplitude, and signal phase, by a local receiver clock from a remote

transmitter; estimate the frequency and phase drifts between a remote transmitter clock in the remote transmitter and the receiver clock using the input pilot signal; compute a clock correction parameter based on the phase and frequency drift estimates; synchronize the local receiver clock with the remote transmitter clock based on the clock correction parameter; estimate a window length using the input pilot signal; and repeat the estimate of the frequency and phase drifts, the computation of the clock correction parameter and the synchronization of the local receiver clock and the remote transmitter clock steps for the window length; wherein the instructions to estimate the frequency drift further cause a computer to: determine a signal-to-noise ratio of the input pilot signal; estimate the window length based on the signal-to-noise ratio; form a window using the estimated window length; and estimate the frequency drift between the remote transmitter and local receiver clocks using a data signal and the input pilot signal over the window" as disclosed in claim 34.

"a computer system for synchronizing clock signals in a communication system used in a multi-carrier system, comprising: a bus; a processor coupled to the bus; a memory coupled to the processor; a data sampler to sample an input pilot signal of a predetermined carrier frequency and phase; a frequency drift estimator, coupled to the data sampler, to receive a data signal along with the input pilot signal, and to estimate a frequency drift between receiver and transmitter clocks using the input pilot signal; a phase drift estimator, coupled to the data sampler and the frequency drift estimator, to receive the data signal along with the input pilot signal, and to estimate a phase drift between the receiver and transmitter clocks using the input pilot signal; an analyzer, coupled to the frequency drift estimator and the phase drift estimator, to receive the estimated phase and frequency drifts, and to compute a clock correction parameter based on the

received estimated phase and frequency drifts; and a synchronizing block, coupled to the analyzer, to receive the clock correction parameter, and to adjust the receiver clock to synchronize a receiver clock with a transmitter clock based on the clock correction parameter; wherein the frequency drift estimator computes a signal-to-noise ratio of the received data signal, wherein the frequency drift estimator estimates a window length based on the signal-to-noise ratio, and forms a window using the window length, and wherein the frequency drift estimator estimates the frequency drift between the transmitter and receiver clocks using the received data signal over the window" as disclosed in claim 38.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

CONCLUSION

2. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Lawrence B Williams whose telephone number is 571-272-3037. The examiner can normally be reached on Monday-Friday (8:00-6:00).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ghayour Mohammad can be reached on 571-272-3021. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Lawrence B. Williams

lbw
May 29, 2008

/Lawrence B Williams/

Examiner, Art Unit 2611

/Mohammad H Ghayour/

Supervisory Patent Examiner, Art Unit 2611